

AZ CORP COMMISSION

BEFORE THE ARIZUNA CURPURATION COMMISSION

JUL 19 2 37 PM 95

Arizona Corporation Commission

RENZ D. JENNINGS CHAIRMAN

MARCIA WEEKS

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

COMMISSIONER

CARL J. KUNASEK
COMMISSIONER

DOCKETED

DOCUMENT CONTROL

JUL 1 9 1995

DOCKETED BY jul

IN THE MATTER OF THE COMPETITION IN THE PROVISION OF ELECTRIC SERVICES THROUGHOUT THE STATE OF ARIZONA.

DOCKET NO. U-0000-94-165

NOTICE OF FILING

Staff hereby files its Draft Report of the Working Group on Retail Electric Competition.

RESPECTFULLY SUBMITTED THIS 19th DAY OF JULY, 1995.

Janige M. Alward
Bradford A. Borman
Attorneys, Legal Division
Arizona Corporation Commission
1200 West Washington Street
Phoenix, Arizona 85007
(602) 542-3402

Original and ten (10) copies of the foregoing filed this https://doi.org/10.1001/jhi/html day of July, 1995, with:

Docket Control Arizona Corporation Commission 1200 West Washington Street Phoenix, AZ 85007

Copy of the foregoing mailed this /9 th day of July, 1995 to:

27

26

28

DAVID C KENNEDY LAW OFFICES OF DAVID C KENNEDY 100 WEST CLARENDON AVENUE, SUITE 200 PHOENIX AZ 85012-3525 3 NORMAN J FURUTA DEPARTMENT OF THE NAVY 900 COMMODORE DR, BLDG 107 5|| P O BOX 272 (ATTN CODE 90C) SAN BRUNO CA 94066-0720 6 THOMAS C HORNE MICHAEL S DULBERG HORNE KAPLAN & BISTROW P C 40 NORTH CENTRAL AVENUE, SUITE 2800 81 PHOENIX AZ 85004 9 BARBARA S BUSH COALITION FOR RESPONSIBLE ENERGY EDUCATION 10 315 WEST RIVIERA DRIVE TEMPE AZ 85252 11 SAM DEFRAW (ATTN CODE 16R) RATE INTERVENTION DIVISION 13 NAVAL FACILITIES ENGINEERING COMMAND 200 STOVALL STREET, ROOM 10S12 ALEXANDRIA VA 22332-2300 RICK LAVIS ARIZONA COTTON GROWERS ASSOCIATION 16 4139 EAST BROADWAY ROAD PHOENIX AZ 85040 17 STEVE BRITTLE 18 DON'T WASTE ARIZONA INC 6205 SOUTH 12TH STREET 19 PHOENIX AZ 85040 20 LOTHAR M SCHMIDT P O BOX 10963 YUMA AZ 85366-8963 21 AJO IMPROVEMENT COMPANY P O DRAWER 9 23 AJO AZ 85321 24 COLUMBUS ELECTRIC COOPERATIVE INC P O BOX 631 25 DEMING NM 88031 26 CONTINENTAL DIVIDE ELECTRIC COOPERATIVE P O BOX 1087 27 ll GRANTS NM 87020

28

	<u> </u>
1	
2	CR BOX 95 BERYL UT 84714
3	
4	P O BOX 790 RICHFIELD UT 84701
5	MOHAVE ELECTRIC COOPERATIVE INC P O BOX 1045
6	BULLHEAD CITY AZ 86430
7	MORENCI WATER AND ELECTRIC COMPANY P O BOX 68
8	MORENCI AZ 85540
9	CHARLES R HIGGINS ARIZONA STATE AFL-CIO
10	110 NORTH 5TH AVENUE P O BOX 13488
11	
12	
13	
14	Ma 1 14
15	Assistant to Janice Alward
16	Assistant to Bradford Borman
17	
18	
19	
20	
21	
22	
23	

mari\94165nof.03

MEMORANDUM

AZ CORP COMMISSION

TO: Parties to Retail Electric Competition Docket

Jul 19 2 37 PM '95

(Docket No. U-0000-94-165)

DOCUMENT CONTROL

FROM:

David Berry

Chief, Economics and Research

Utilities Division

Arizona Corporation Commission

1200 West Washington Phoenix, Arizona 85007

DATE:

July 19, 1995

RE:

FIRST DRAFT REPORT OF THE WORKING GROUP ON RETAIL

ELECTRIC COMPETITION

Enclosed is a first draft of the report of the Working Group on Retail Electric Competition. Please review this draft and send me your comments by August 11, 1995. You can mail your comments to me at the above address or fax them to me at (602) 542-2129. My phone number is (602) 542-0742.

After receiving your comments, I will prepare a second draft and send it to you. We will review the second draft in a meeting of the entire Working Group in September. I will schedule the meeting at the time I send out the second draft.

If we can reach closure at the September meeting, I will prepare the final version of the report and send it to all interested parties. The final version of the report will conclude the first phase of our investigation into retail electric competition.

In the second phase of our investigation, I anticipate that we will solicit written responses to questions on policy. The second phase will thus be devoted to obtaining the public's recommendations on policy options.

c:\compete\report\transmem.mem

REPORT OF THE WORKING GROUP ON RETAIL ELECTRIC COMPETITION

Docket No. U-0000-94-165

July 18, 1995

Utilities Division
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007

DRAFT

REPORT OF THE WORKING GROUP ON RETAIL ELECTRIC COMPETITION

I. INTRODUCTION

This report presents a synopsis of the major issues associated with retail wheeling of electricity. It identifies regulatory options and implementation issues, but does not offer any recommendations on policy.

Context

Interest in retail electric competition has both economic and political origins. Politically, competition is encouraged by actions in California to introduce greater competition (California Public Utilities Commission, 1995) and by widespread support for having choices in purchasing goods and services. Economically, competition is attractive because the market price of electricity may be less than the regulated rate. Figure 1 shows the effective rate (dollars per kilowatt hour) paid by a hypothetical large industrial consumer for electricity supplied by Arizona Public Service Company (APS) and Tucson Electric Power Company (TEP) under tariffed rates (in these cases between \$0.05 and \$0.07 per kWh).

In contrast, the market price of energy is lower --between \$0.02 and \$0.03 per kWh for short term firm or nonfirm energy, around \$0.03 to \$0.04 per kWh for intermediate term firm energy and power, and \$0.03 to \$0.05 per kWh for power and energy from a newly constructed gas-fired combined cycle unit (Figure 2). The difference between tariffed rates and market rates is due to:

- plentiful generating capacity in the southwest,
- possible inefficiencies in utility production and management processes,

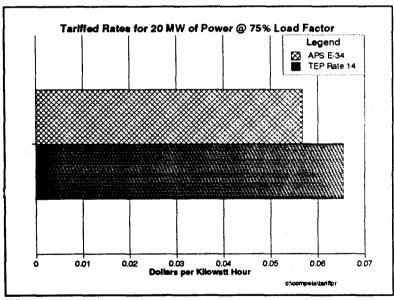


Figure 1

- improvements in new generating technology relative to existing power plants, and
- technological choices made by utilities in the 1970s when nuclear and coal resources were built; in today's market, efficient, natural gas-fired power plants are cheaper to build and run, in large part because of currently cheap natural gas.

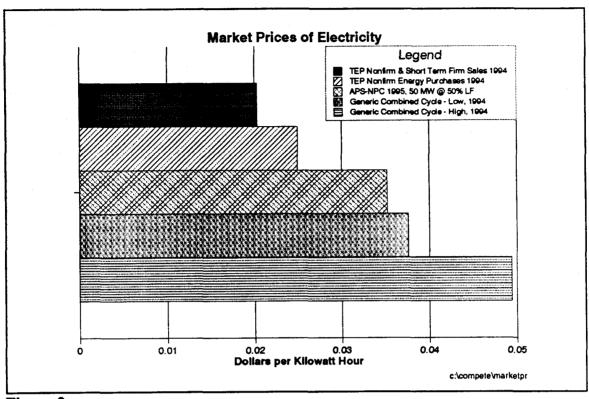


Figure 2

Assumptions for Market Prices of Electricity.

- ♦ TEP nonfirm and short term firm sales and nonfirm energy purchases: TEP FERC Form 1, 1994.
- ♦ APS-NPC 1995: APS Contract with Nevada Power Company dated September 14, 1993. Price shown assumes 50 MW of power and a 50% load factor for the first year of sales; the rate increases in the second and third years. Half the energy is assumed to be sold during onpeak hours.
- Generic combined cycle plant uses cost data from U.S. Department of Energy, Energy Information Administration, Supplement to the Annual Energy Outlook 1995, DOE/EIA-0554(95), Table 29, inflated to late 1994 costs. Plant is assumed to be 100 MW run at a 75 percent capacity factor, with a heat rate of 7707 BTU/kWh. Cost pertains to first year of a 20 year agreement; costs in subsequent years increase at rate of inflation. Transmission and ancillary costs are assumed to be \$0.005 per kWh. Low cost assumes 1995 gas cost of \$2.03 per MMBtu escalating at a real rate of 0.007 per year and a real discount rate of 0.10. High cost assumes 1995 gas cost of \$2.25 per MMBtu escalating at a real rate of 0.04 per year and a real discount rate of 15 percent.

A consumer's choices today include purchasing from the monopoly electric utility, demand side management, and self-generation (Figure 3). With retail wheeling, the consumer would have the additional option of being able to purchase from the generator of his choice (using the transmission and distribution system) or from a pool of generators. Wheeling refers to transmission of electricity for others and retail wheeling would occur when a consumer or energy portfolio manager purchases electricity from a generator that is not the local utility and has the energy transmitted over the transmission and distribution system owners' lines to the point of consumption.

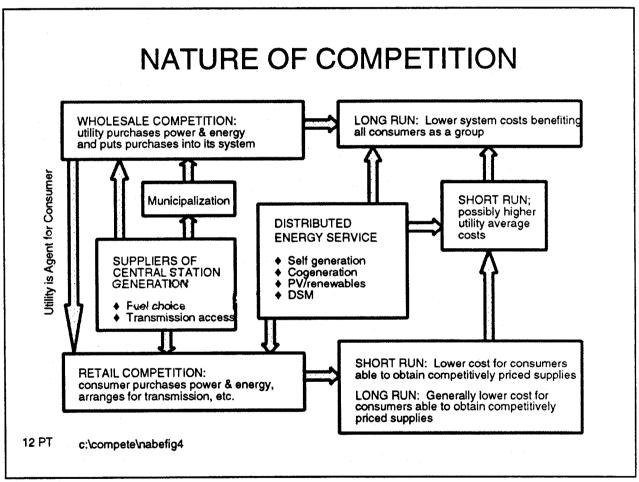


Figure 3

Investigation Into Retail Competition

The Commission established Docket No. U-0000-94-165 to investigate whether and how to introduce competition into electric supply. The first phase of this investigation focused on educating the interested parties, including the Staff and the Commission, on the issues. Subsequent phases will address recommendations on policies.

To accomplish the objective of the first phase, educating ourselves on the issues, Staff conducted a workshop in September 1994 and then established a Working Group on Retail Electric Competition. This report summarizes the discussions of the Working Group. The Working Group met on January 25, 1995, and then broke into three Task Forces to more closely investigate the following issues regarding retail electric competition:

- ♦ The options for introducing competition, including retail wheeling and maintaining the status quo.
- ♦ How the options could be implemented.
- ♦ The advantages and disadvantages of the options.

The Task Forces were:

- ♦ The System and Markets Task Force -- which investigated transmission access and prices; system reliability; transmission and generation system operation; functioning of markets; and related issues.
- ♦ The Regulatory Task Force -- which investigated stranded investment; alternative rate regulation; obligation to serve; transaction costs of participating in the market; dispute resolution; legal and jurisdictional matters; and related issues.
- ♦ The Energy Efficiency and the Environment Task Force -- which investigated the role and implementation of demand side management; role and implementation of renewables; environmental consequences of power production; role of integrated resource planning; and related issues.

Table 1 lists the organizations who have participated in this process. Each Task Force met twice during the first half of 1995.

Table 1. Participating Organizations

Arizona Corporation Commission Staff	Residential Utility Consumer Office		
•			
Arizona Public Service Company	Arizona Department of Commerce Energy Office		
Arizona Electric Power Cooperative	Fort Huachuca		
Citizens Utilities Company	International Brotherhood of Electrical Workers		
Tucson Electric Power Company	Land and Water Fund		
Salt River Project	RMI		
Navopache Electric Cooperative	Nordic Power		
Trico Electric Cooperative	Enron Power Marketing		
Duncan Valley Electric Cooperative	Arizona Association of Industries		
Sulphur Springs Valley Electric Cooperative	Phelps Dodge Corporation		
Diné Power Authority	Karsten Manufacturing Corporation		
Southwest Gas Corporation	Honeywell		
City of Mesa	Motorola		
Arizona Power Pooling Association	Intel		
Arizona Municipal Power Users Association	Vision Power Service		
Pinnacle West Capital Corporation	Natural Gas Clearinghouse/Electric Clearinghouse		
Arizona Utility Investors Association	Neidlinger & Associations		
Snell & Wilmer	Douglas C. Nelson P.C.		
Plains Electric	Magma Copper Co.		
R.W. Beck	Cyprus Climax Metals		
Energy Strategies, Inc.	Arizona Community Action Association		
Brown & Bain	Fennemore Craig		
Arizona House of Representatives Research Staff	Arizona Senate Research Staff		

Summary of Report

This section summarizes the major issues discussed in the report. The remaining sections provide more detail. Section II addresses system and market issues. Section III reviews regulatory issues and Section IV summarizes energy efficiency and environmental issues. Task Force reports on these issues were prepared during the first half of 1995. Retail wheeling has generated a huge literature and the Reference Section lists some useful documents.

The basic policy question is whether to introduce retail wheeling into Arizona. The Commission could opt to retain regulated monopoly utilities with traditional cost of service regulation or with incentive or performance based ratemaking. Alternatively, the Commission could pursue a policy of allowing retail wheeling, perhaps with incentive or performance based ratemaking for utility service to those sectors where competition does not materialize quickly.

If retail wheeling is introduced, it could apply to all consumers or only to consumers meeting a criterion such as a size minimum or customer classification. If retail wheeling is available to all consumers, some consumers may still not have a choice. Residential or small commercial consumers may face relatively high costs of participating in the market on an individual basis and it may not profitable for suppliers to serve smaller accounts.

The introduction of retail wheeling requires that many pivotal decisions be made regarding: the breadth of the market, the structure of the market, generation structure, system reliability, transmission and distribution (T&D) regulation, recovery of stranded investment, reciprocity among jurisdictions allowing utilities from other jurisdictions to enter their utilities' service areas, encouragement of energy efficiency, the role of integrated resource planning, encouragement of renewable generating resources, environmental impacts of power production and delivery, and types of regulation in the noncompetitive sector of the market. Options are outlined in Table 2 and discussed in detail in the remainder of this report. Outcomes from selecting options depend on various economic and institutional factors, and these are highlighted in the third column of the Table.

In addition, there are legal issues surrounding whether and how retail wheeling is implemented. These are briefly addressed in this report. A more complete review of legal issues may be entertained by the Commission in future legal arguments.

Table 2. Decisions Associated with Introduction of Retail Wheeling

Issue	Regulatory Option	Key Influences on Outcomes
Market Breadth	Allow all consumers to obtain service in competitive market Phase in competition and allow only larger consumers to obtain service in competitive market at first	a) Whether high transaction costs will prohibit smaller consumers from participating in market b) Whether energy portfolio managers will successfully aggregate smaller consumers
Market Structure	 Require utility divestiture into genco, transco, disco Allow vertically integrated utilities 	a) Whether regulation can overcome utility incentives to impede access to transmission system b) Utility resistance to divestiture
Generation Structure	Let market decide on use of bilateral contracts and poolco Require exclusive poolco Require combination of poolco with bilateral contracts	 a) Whether spot market will develop with widely available spot price information b) Ability of firms who invest in new generating capacity to recover long run marginal cost c) Extent of price hedging and contracting for rates that differ from real time short run marginal cost d) Availability of equipment necessary to record sales and purchases
System Reliability	 Let market determine system reliability and ancillary services Designate parties responsible for system reliability and ancillary services Regulate standards (and rates) for reliability and ancillary services 	 a) Transaction costs of setting industry standards for system reliability b) Ability to track purchase and sale of ancillary services c) Ability to monitor and control system reliability
T&D	Regulate T&D rates, terms & conditions	a) Comparability of access & rates for all consumers & generators
Stranded Investment	 Allocation of stranded investment among utility, consumers in competitive market, and consumers in noncompetitive market Collection mechanism (e.g., exit fee, wires charge) Period over which stranded investment is collected (e.g., 5 years, 30 years) 	 a) Magnitude of stranded investment b) Uncertainty of magnitude of stranded investment c) Mitigation of stranded investment d) Effect of recovery on rates e) Effect of recovery on economic efficiency
Reciprocity	Allow all sellers to compete Allow non-jurisdictional utilities to compete only if they allow reciprocal sales in their markets	Legal review of Commerce Clause Relative disadvantage of not allowing retail wheeling when other jurisdictions allow retail wheeling

Table 2. Decisions Associated with Introduction of Retail Wheeling (Continued)

Issue	Regulatory Option	Key Influences on Outcomes
Energy Efficiency & Demand Side Management in Competitive Market	 Require cost effective DSM programs with mechanism to pay for DSM ♦ only participants pay for DSM programs ♦ nonparticipants also pay for some of DSM program costs Leave DSM to market (including utility provision of DSM as a service paid for by participants) 	 a) Transaction costs for consumers to participate in DSM b) Pace of market transformation c) Ability of suppliers or consumers to bypass required DSM program costs d) Effect of DSM program costs on rates/perceived fairness of distribution of DSM program costs e) Business strategy of energy suppliers short term cost avoidance versus provision of a wide variety of services
Integrated Resource Planning (IRP)	Continue with IRP as currently conducted with only some modifications Revise IRP to reflect long term utility strategic commitments Discontinue IRP	 a) Planning horizon of suppliers b) Ability of some suppliers to escape IRP c) Degree to which stakeholders can provide input into long term plans
Renewable Generating Resources	 Let market determine investment in renewables and in learning about renewables Require utilities to prepare plans and commitments to renewables Require utilities to make specified investments in renewables 	 a) Transaction costs of participating in market for renewables (including utility knowledge of renewables benefits) b) Costs & performance of renewables c) Business strategy of electricity suppliers - short term cost avoiders versus long run investors d) Ability of some suppliers to escape regulatory requirements
Environ- mental Impacts	Leave environmental issues to others Require utilities to indicate how environmental issues are incorporated in plans and commitment of management to implementation of plans Require monetization of externalities	a) Degree to which environmental externalities are captured by existing standards b) Site-specific environmental impacts c) Commitments of utilities to reducing environmental impacts
Type of Regulation for Non- competitive Market (if any)	1) Traditional cost-plus ratemaking 2) Incentive rate-making ◆ benchmarking prices ◆ treatment of uncertainty ◆ quality & reliability standards ◆ rewards & penalties for customer satisfaction, efficiency, productivity	 a) Risk of divergence of cost and price b) Ability of buyers and sellers to manage & hedge risks c) Effectiveness of incentives (if any)

II. SYSTEMS AND MARKETS

This section addresses the functioning of the transmission and generation system and the markets for transmission and generation in each of several operational paradigms (Box A). There are many issues associated with systems and markets and the summary at the end of Section II highlights the major points raised in this section.

Utilities Remain Vertically Integrated, Bilateral Contracts Model

With bilateral contracts. consumers could enter into contracts with the generators of their choice and would have to obtain transmission, distribution, and ancillary services. The Federal Energy Regulatory Commission (1995) classified ancillary services as: reactive power/voltage control service, loss compensation service, scheduling and dispatching service, load following service. system protection service, and energy imbalance service. Energy portfolio

Box A Operational Paradigms

Retail Wheeling Occurs for Some or All Consumers

- Vertically Integrated Utilities, Bilateral Contracts
 Model
- Vertically Integrated Utilities, Exclusive Poolco Model
- Vertically Integrated Utilities, Combined Poolco Bilateral Contracts Model
- Divested Utility Model

Retail Wheeling is Absent

Regulatory Incentives Models

managers could package these various services on behalf of consumers, or individual consumers may act as their own energy portfolio managers. New hardware and software technologies will be required to facilitate transactions.

System Operation: Transactions would occur through negotiated or standard contracts between buyers (consumers or energy portfolio managers) and sellers (utilities, market brokers, power marketers, or independent power producers). Otherwise, system operation would be similar to today's system (but generation, transmission, and distribution services could be unbundled). A host utility could control system operations, schedule generation, and provide transmission and distribution services. Consumers, or their agents, would have the opportunity to access the transmission system. The host utility would have an obligation to connect consumers to the grid.

<u>Power Pricing:</u> Prices, terms, and conditions would be negotiated and could vary from case to case. Standard prices might be used for smaller contracts. Ancillary services could be purchased in a competitive market for those services. However, distribution and transmission prices still would be regulated. New accounting procedures would have to be established for unbundled service revenues and associated costs.

Facilitating Transactions: The market may develop market centers or hubs to reduce

transaction costs. Among the services which could be provided by administrative or financial specialists are: title transfer, confirmation of transactions, credit standards, invoicing, accounting, scheduling supplies and demands, balancing services (to deal with differences between the amount of electricity contracted for and the amount used), wheeling, dispatch of generation and transmission, routing, short term exchanges, notification for interruptible customers to go off line, and trades of imbalances or of energy (Vallen and Sharp, 1995). These services could be provided by utilities, power marketers, or new entrants in the market.

Generation Construction and Operation: Construction decisions would be up to suppliers and the market would determine generation needs. For example, independent power producers would determine when to add capacity and what type to add. In order to obtain financing for new generating capacity and to improve the chances of covering long run marginal cost, generators may have to sign long term contracts with purchasers for the output before construction begins.

The host utility may not be responsible for generation in general. Other service providers could provide back-up services, for example. A percentage of generation could be committed for reliability, the costs of which might be included in a demand charge.

Transmission Construction, Operation, Pricing and Access: Transmission would probably remain monopolistic and pricing and access would likely be regulated by the Federal Energy Regulatory Commission (FERC). Reliability could be promoted by industry groups, such as the Western System Coordinating Council (WSCC), but such groups may have no means of enforcement. Regional transmission groups could require those accessing the system to maintain system standards. Coordination between generation suppliers and transmission groups would be needed in construction and operation of transmission systems.

Consumers or energy portfolio managers would contract with the transmission system operators for delivery. Technology developments, such as devices that help to control power flows and sophisticated metering and communication equipment, are making it possible for transmission access to be available to all consumers.

System Reliability: Responsibility for planning and reliability under this scenario is uncertain. More transactions could occur than are currently occurring, with more parties involved in each transaction. Operators, generators, and consumers would need to communicate more frequently and new computer software would be needed to facilitate transactions. Maintaining reliability will be more challenging. A multiplicity of contracts could create complexities, which currently are not fully understood, in managing the system and its constraints.

Generation reliability and transmission and distribution reliability could be addressed in

several ways. In one, host utilities would set criteria, be responsible for operating the system in a reliable manner, and provide ancillary services, such as spinning reserve and reactive power, for a fee. Utilities and energy portfolio managers would be responsible for providing reliability as demanded in the market. Alternatively, voltage support, spinning reserve, and other reliability assurance measures may be provided through reliability service companies, subject to voluntary industry regulation (e.g., coordination by the North American Electric Reliability Council).

Advantages of a Bilateral Contracts Model:

With bilateral contracts in a competitive market, generation, transmission, and distribution would build upon today's utility systems; new institutions would not be required immediately. As in other scenarios, the transmission and distribution systems would remain as a "natural" monopoly. Bilateral contracts would allow consumer choices in the reliability of power delivered and price. Where the technology and information exist, some consumers would, thus, have lower prices and more choices among suppliers. In addition, competition could foster innovations that increase production and reduce costs, and system planning also may improve as it becomes more demand driven. Cross-class subsidies, if any, could be reduced as costs and prices of services become more closely correlated.

The bilateral contracts model also offers generation suppliers the opportunity to enter into long term contracts with consumers. Such contracts may be necessary for investors to take the risk of building new generating capacity.

Disadvantages of a Bilateral Contracts Model:

The transaction costs of negotiating and enforcing numerous special contracts among buyers and sellers and among various providers of reliability services and energy portfolio managers could be much higher than parallel costs internalized within utilities today and avoided by having only one monopoly supplier. These transaction costs include expertise needed to develop and implement contracts, manage risks, develop standards, and implement metering and electronic bulletin boards for information on transmission capacity, transactions, and possibly spot market activity, etc. As indicated above, market centers may develop to reduce some of these transaction costs. Only larger industrial and commercial consumers and energy portfolio managers who aggregate many smaller consumers may be able to afford the transaction costs of participating in the market, however. Smaller consumers acting individually may not be able to afford the transaction costs.

Extensive and expensive metering would be required. The metering technology is not available yet to implement this model on a large scale. Further, better informed buyers and sellers may profit at the expense of poorly informed buyers or sellers due to information

asymmetries.

This model may be less reliable than today's system in responding to abnormal conditions that require system recovery or in normal day-to-day operation. Further, dispatch may not be efficient because the entire system is not centralized for economic dispatch (however, the market may provide incentives for efficient dispatch). Integrated resource planning may become more complex or disappear, and forecasting, planning, and outage maintenance planning could be more difficult. Finally, a spot market with widely available spot price information may not develop, thereby limiting buyers' and sellers' knowledge of the market.

Other Comments:

Energy prices would be an important factor in determining from whom a consumer buys. The amount of reliability provided would be based on customer preferences. Utilities would require flexible plans to compete. To obtain financing for new projects, suppliers would need long-term contracts (5 or more years) with purchasers.

Utilities Remain Vertically Integrated, Exclusive Poolco Model

The Federal Energy Regulatory Commission described a poolco as follows:

[T]he poolco would be an independent entity that would not own any (or would own only a limited number of) facilities, but would control the operation of some or all generators, and all transmission facilities, in a region. The poolco would be open to all generators connected to the grid, who would automatically receive any transmission service needed to sell power into the regional pool. In effect, the poolco would be responsible for creating and maintaining a regional spot market for electricity. The spot price in each trading period (perhaps hour-by-hour) would be readily available and made known to all market participants.

Generating resources would be centrally dispatched on an hourly basis by the poolco in much the same way as in current power pools. The principal difference appears to be that generators would be dispatched based on the bid price they submit to the poolco, rather than on their running costs. The poolco would operate a least-cost (in the sense of lowest bid) dispatch that accounts for any transmission constraints in the same manner as an existing power pool or a single utility dispatch center....

In effect, the poolco would become the market clearinghouse for the

hourly energy market.1

In the exclusive poolco model, the government establishes the poolco or the industry establishes the poolco. The poolco is an independent system operator which controls all power transactions, where all generators sell to the system operator and all purchasers buy from the system operator. Sales by the poolco are spot market sales, not long term contract sales.

System Operation: All generators and purchasers present offers to the system operator, and the system operator sorts bids to determine which generators to run and which consumers obtain electricity. The price of energy is determined in this marketplace, and the poolco will have to set rules for determining the price (e.g., each successful supplier is paid its bid price; each successful supplier is paid the bid price of the highest bidding successful supplier; each successful supplier is paid the bid price of the lowest bidding unsuccessful supplier; etc.). Purchasers from the poolco could be consumers or brokers who could resell electricity to consumers under short term or long term contracts at (unregulated) negotiated prices. Transmission and distribution services would probably remain regulated monopolies.

In this model, energy at any time is viewed as a standard homogeneous commodity. Implementation of the poolco would require the development of new dispatch and contractual arrangements. Everyone could be their own energy portfolio manager, but energy portfolio managers could represent numerous consumers. Separate financial contracts would be allowed, such as contracts for differences or hedging instruments.

The poolco would prepare short-term load forecasts, dispatch power, and ensure physical delivery of energy. Generation needs and system reliability would be market driven. System reliability would be more complex than the current system, due to the increased number of transactions (however, it may be simpler than the bilateral contracts model).

Power Pricing Electricity at a given hour would be regarded as a standard homogeneous commodity with a standard price, which would be the market clearing price. There could be three or four parts to a customer's electricity bill: (1) electricity costs from the poolco via the generator (these costs would be unregulated), (2) transmission costs (regulated by FERC), (3) costs of distribution services from the host utility (regulated by the Commission), and possibly (4) a reserve margin or other system reliability charge imposed on all suppliers and passed through to consumers. Prices could be more volatile in this model relative to other models, and financial hedging instruments, including derivatives, probably would be used to manage price risks.

Federal Energy Regulatory Commission. "Inquiry Concerning Alternative Power Pooling Institutions Under the Federal Power Act." 18 CFR Chapter I, Docket No. RM94-20-000, (October 26, 1994), pp. 5-6.

Retailing: Marketing would probably become more creative in order for service providers to differentiate their services. The industry could become more service oriented if the electricity itself is a homogeneous product. Provision of energy services and demand side management could be used to differentiate providers. For example, one service provider may specialize in reliability, where another provider specializes in demand side management and cost reduction techniques.

<u>Facilitating Transactions:</u> As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. In addition to the services similar to those described in the section on bilateral contracts, the market center would also develop a spot market in electricity with spot market prices. The poolco could serve as the market center.

Generation Construction: Construction of new generating plants would be risky in the absence of long term sales contracts. Investors would determine whether to build new generating units based upon whether short run marginal cost exceeds long run marginal cost, and the relationship between short run and long run marginal costs could be volatile.

Advantages of the Exclusive Poolco Model:

Under the exclusive poolco model, all consumers or their agents would know the market price at each hour. In addition, power would be dispatched in order of bid (cheapest first), subject to restrictions on transmission.

Disadvantages of the Exclusive Poolco Model:

Transitional costs to implement this model would include (unknown) costs of setting up the poolco. In addition, overhead costs may increase due to the increased complexities of system operation. For example, new and extensive metering would be required to implement this model, although most consumers might not pay real-time rates but could instead purchase from power marketers or others who buy energy at real-time rates and resell it at less volatile rates.

Bidders in the poolco may game their bids. Also, bidding would be heavily dependent on short run marginal cost, which could make investments in new generating capacity relatively risky. Companies wishing to build new generating capacity without long term contracts to sell the output of the plants would be less certain of covering their long run marginal cost with an exclusive poolco.

Regulators and consumers in low cost regions might not want their utilities to bid into the pool because prices in their region might go up.

Other Comments:

Society would need to become educated about the new system and risk management strategies. Consumers could customize the purchase of electricity to meet their needs through energy portfolio managers. For example, energy portfolio managers could develop different packages of generation, transmission, and distribution services, and offer various price hedges for consumers.

There may not be enough generators to create an Arizona specific poolco, and the pool may have to be expanded beyond state boundaries to have sufficient bidders. There is also uncertainty about jurisdictional issues, such as FERC control of prices in the pool.

Vertically Integrated, Combined Poolco - Bilateral Contracts Model

The combined pooleo - bilateral contracts model ("combined model") allows for long, medium, or short term bilateral transactions and spot market purchases at pooleo prices. Because of the potential for monopoly control of transmission and distribution access and pricing, transmission and distribution would be regulated. In a combined model, the government may require establishment of the pooleo or the industry may establish the pooleo itself in response to market forces to facilitate power transactions.

System Operation: Current system operations could be maintained, with the poolco as a source of spot market energy. The poolco would serve as an objective (or neutral) system operator, and may be regulated by either government or the industry to ensure neutral operation. It would coordinate power production by generators and coordinate sales to users at a market clearing price. The spot price of energy is determined in this marketplace and the poolco will have to set rules for determining the price as described above for the exclusive poolco. In addition, long, medium, and short term bilateral contracts could be negotiated. Utilities may be responsible for maintaining system reliability, but other companies may also provide reliability services.

Generation Construction: Generation construction would be driven by either high short run marginal costs or by long term contracts. Firms building new generating capacity may not have to subscribe all new capacity and could sell some energy from new plants on the spot market.

<u>Power Pricing:</u> Long term capacity and energy prices could be established via negotiated prices in bilateral agreements and short term prices could be set through the spot market. Further, long term contract prices could be linked to spot market prices. This model would provide more market knowledge about spot prices than would the bilateral contracts model.

<u>Facilitating Transactions:</u> As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. In addition to the services applicable to bilateral contracts, the market center would also develop a spot market in electricity with spot market prices. The poolco could serve as the market center.

<u>Transmission Construction, Operation, Pricing, & Access:</u> The FERC would govern transmission access and pricing, including pricing to cover new construction. Transmission operation could be carried out by utilities or by the poolco, or by both in a coordinated manner.

Advantages of the Combined Model:

Consumers would have a choice of energy suppliers, and generators would have the choice to bid capacity to the pool or to sell outside the pool. Firms constructing new generating plants could enter into long term bilateral contracts to sell power and thus reduce the risk of investing in new facilities relative to the risks inherent in an exclusive poolco. Also, because the poolco sets a spot price, more market knowledge would be available about market clearing prices, relative to the bilateral contracts model. The poolco spot price could also provide a benchmark, short-term price for bilateral contracts.

Disadvantages of the Combined Model:

A combined poolco - bilateral contracts model will incur unknown, possibly large costs in setting up the poolco. Transition costs would include additional costs of hardware, computer software, metering, and educating the public. Better informed buyers and sellers may profit at the expense of poorly informed buyers or sellers due to information asymmetries in the bilateral contracts segment of the market.

With a combination of a poolco and bilateral contracts, dispatch of generation and transmission may not be efficient because the entire system is not centralized for economic dispatch. However, the market may provide incentives for efficient dispatch. Further, poolco bidding rules may create inefficiency, resulting in gaming in bidding behavior. Finally, integrated resource planning may become more complex or disappear in the combined model.

Other Comments:

Energy portfolio managers could offer retail services. Consumers may hedge against fluctuating poolco prices by contracting with another party who resells electricity to consumers at stable rates and who takes the risk of hourly poolco price fluctuations. Lastly, there is uncertainty about jurisdictional issues, such as FERC control of prices in the pool.

Utilities Divest Generation and Possibly Transmission Facilities

With divestiture, the market becomes segmented by function and generation companies are expected to operate in a competitive environment. Under this scenario, the following market sectors could develop.

Gencos: Generating companies that purchase, lease, construct, operate, and maintain power plants.

Poolcos: As previously described, a poolco is an independent system operator that forms a spot market for short-term sales and coordinates power deliveries. Regulation of the poolco may be by the FERC, state utility regulators, and possibly by the industry. Generators and consumers may also be able to execute bilateral contracts in lieu of poolco purchases and sales.

Transcos: Companies that purchase, lease, construct, operate, and maintain transmission facilities.

Discos: Companies that construct, operate, and maintain the local distribution wires.

Retailcos: Retail companies or energy portfolio managers that provide electricity and energy services to end users, obtaining or coordinating the necessary energy, power, transmission, distribution, and reliability services to make retail sales.

System Operation: Some type of system coordinator must be created that would coordinate the entire synchronous system. Transmission cannot be balanced if separate control areas exist for generation and transmission. Voltage maintenance and synchronization would be required for both generation and transmission. There could also be requirements for reserve margins.

<u>Power Pricing</u> Energy and capacity pricing would be market based. Consumers could engage in bilateral contracts. Necessary ancillary services would also have to be contracted for and high cost load following services may be sold at high prices.

<u>Facilitating Transactions:</u> As discussed in conjunction with bilateral contracts, the market may develop market centers or hubs to reduce transaction costs. In addition to the services applicable to bilateral contracts, the market center would also develop a spot market in electricity with spot market prices.

Generation Construction & Operation: Generation needs would be determined by the market and construction would be managed by a Genco. Generation companies must work together with transmission companies, and vice versa, for planning.

Retailing: It will be necessary to assemble packages of generation, transmission, distribution, and ancillary services and develop price hedging arrangements. Consumers, retailcos, or energy portfolio managers could perform these services or the services could be performed by distribution companies. However, distribution companies could simply be common carriers without any retailing functions.

Advantages of a Divested Utility Model:

A principal reason for divestiture is that the incentive for utilities to impede access to their transmission systems to inhibit competition in generation would be eliminated. In addition, incentives for efficiency gains would be created by unbundling services into profit centers. Cross subsidies among generation, transmission, and distribution would be removed (however, the removal of cross subsidies could be a disadvantage to some parties).

Disadvantages of a Divested Utility Model:

Regulatory authority to require divestiture of utility assets may be questioned and result in a protracted legal dispute. Further, utilities and utility shareholders may strongly resist divestiture.

Inefficiencies could result from the loss of traditional coordination of generation, transmission, and distribution services. Also, there is a possible loss of economies of scale. Certain functions could be duplicated increasing administration and marketing costs. If market centers do not emerge, the increased transaction costs of dealing with many suppliers of generation, transmission, distribution, and retailing services may offset any cost reductions due to increased competition.

Operational Model When Retail Wheeling is Absent

Retail wheeling could be absent from some or all of the market because regulators reject retail wheeling or because retail wheeling is encouraged but the transaction costs of market participation are prohibitively high for smaller consumers. In either case, regulators could continue with rate regulation for the non-competitive portion of the market.

When retail wheeling is absent, the market would not change substantially from the situation today. However, to attain some of the efficiencies expected from competition, regulators and utilities could pursue greater wholesale competition and pricing mechanisms that simulate, to some extent, a competitive market. Regulators, for example, might allow flexible pricing in some circumstances and might base rates on utility performance and market price indicators instead of on historically incurred costs. These topics are discussed in the section on Regulatory Issues.

System Operation: System operations could remain virtually the same as today, with the exception that regulatory incentives could be provided for efficient and reliable operations. Utilities would have the obligation to serve and could continue to employ integrated resource planning. Alternatively, a poolco could be mandated to improve operational efficiencies through wholesale competition. The California Commission (1995) proposed a modified wholesale poolco into which sellers could bid and from which utilities must purchase energy.

<u>Power Pricing:</u> Incentive based rate making could be adopted by the Commission to encourage utilities to keep prices competitive. Examples of incentive based rates are price caps, performance based rates, and rates linked to price indices. In addition, the Commission could allow flexibility in contracting and in repackaging services (including price, terms, and DSM). The Commission could allow prices to be de-averaged so that prices reflect the costs to serve each type of customer. Services may be unbundled and priced separately. Buy-throughs, similar to the North Star Steel arrangement (Decision No. 58795), may become more prevalent. Incentive based rate making is discussed in the section on Regulatory Issues.

<u>Facilitating Transactions:</u> There may be value in developing market centers even if retail wheeling is absent. The transaction costs of a wholesale market might be reduced by having a market center to administer title transfers, confirm transactions, set credit standards, do invoicing and accounting, schedule supplies, balance services, engage in wheeling, dispatch generation and transmission, route electricity, make short term exchanges, and trade imbalances of energy.

Efficiency Improvements Without Retail Wheeling:

To lower prices, utilities could: continue to look for cheaper wholesale supplies; build on-site generation for their customers to defer new generation; use price indices as benchmarks (for example, use other utilities' prices as the benchmark price, or use marginal costs of generic power plants as benchmarks); rethink and reorganize objectives; create functionally based profit centers; reduce capital investments; improve power plant operations; reduce carrying charges on inventories; and reduce debt service.

The Commission could enhance utility competitiveness by providing more streamlined reviews of utility filings such as approving tariffs with flexible rates.

Incentives for efficient production in a monopoly environment could result in cost and price reductions and benefits which would be system wide and would not just accrue to individual consumers. Further, no new capital would be required unless a wholesale poolco were required. Transition costs would also be minimized. Less equipment would be needed for monitoring individual contracts relative to the other options.

Planning would be more certain and less complex; this scenario may have lower risks

relative to the other scenarios. Utilities would have a longer run view for planning. System reliability, DSM, integrated resource planning, renewables, and low income programs could be maintained.

Opportunity Costs of Foregoing Retail Wheeling:

Potentially greater benefits under competition would be forgone if retail wheeling were absent. Prices may not be market based and consumers would not be able to benefit from shopping around for services, except for purchases of distributed energy services such as on-site cogeneration or buy-throughs. There is a potential for price discrimination with buy-throughs since not all customers may be eligible for buy-throughs. Should an exclusive wholesale poolco be required, investors in new generating facilities may face greater risk if long term wholesale contracts or other arrangements are not possible.

Summary of Major Systems and Markets Issues

Adding many buyers and sellers to the market place will necessitate changes in the way transactions are accounted for so that buyers are properly billed and sellers of energy, power, and ancillary services are properly compensated, so that adverse externalities on the system are managed or prevented, and so that system reliability is maintained. There is a cost to making such transactions, and several approaches have been proposed to control these costs.

One approach to cost control is to build on the existing systems and markets as additional buyers and sellers enter the market via bilateral contracts. However, many accounting and operational complexities can arise that require coordination among buyers and sellers. Market centers may be able to reduce some of these transaction costs by taking on administrative, financial, and physical aspects of operating the power system and its markets. With only bilateral contracts, a spot market with price data available to all buyers and sellers may not develop, thereby limited buyers' and sellers' knowledge of the market.

An alternative approach is to create an independent system operator who is responsible for accounting and operational issues for generation, transmission, distribution, and perhaps even retailing of electricity. The independent system operator could run a poolco for some or all transactions. The poolco has the advantage of creating a spot market price in electricity known to all buyers and sellers and of coordinating dispatch so as to minimize short run marginal cost subject to constraints on transmission availability. The independent system operator could also serve as a market center. However, the cost of setting up and running the poolco is unknown and could require development of equipment and software that are not currently available.

For a competitive market to work smoothly, investors will need to manage the risks of building new generating plants. One important ingredient in risk management is the ability to

enter into long term agreements to sell power from new plants at an agreed-upon rate or rate formula that covers long run marginal cost. If all power sales were required to be made to a poolco and sold from the poolco, prices would tend toward short run marginal cost. Short run marginal cost is likely to fluctuate above and below long run marginal cost.

Predicting the best institutional mechanism for introducing retail wheeling is difficult. Perhaps the need for and scope of poolcos and market centers could be decided by buyers and sellers as experience with the market is obtained.

III. REGULATORY ISSUES

With retail wheeling come several regulatory issues: recovery of stranded investment, changes in transaction costs, new roles for regulation, revisions to a utility's obligation to serve, and legal questions.

Stranded Investment

Several definitions of stranded investment have been offered:

- "Utility plant not used in the provision of utility service due to technological obsolescence or market changes" P.U.R. Glossary for Utility Management, 1992.
- "...Investment in generation, transmission, or distribution facilities whose market value is less than the net book value of those facilities (i.e. less than the cost of the facilities minus accumulated depreciation)." Staff Report on the Retail Electric Competition Workshop, October 1994, p. 10.
- "Where a customer has a legal obligation to bear certain costs, and finds a way to avoid that obligation, the costs are truly 'stranded.' 'Stranded' cost, therefore, results not merely from costs exceeding market, but from customers leaving without paying costs incurred on their behalf. Put another way, the term 'stranded' should apply only where there is a violation of a quid pro quo. There is a violation of a quid pro quo where (a) the utility was compelled (by contract or franchise) to make an investment and (b) a customer for whom the investment was intended avoids its cost responsibility for that investment" (Hempling, Rose, and Burns, 1994. p. 5).
- "Retail stranded costs are defined as any legitimate, prudent and verifiable costs incurred by a public utility or transmitting utility to provide service to a retail franchise customer that subsequently becomes, in whole or in part, directly or indirectly, an unbundled transmission services customer of that public utility or transmitting utility" (FERC, 1994).

Figure 4 summarizes the genesis of stranded investment and Tables 3 and 4 summarize stranded investment issues. The stranded investment of interest is the difference in the present value of the net revenue streams with and without a change in regulation allowing retail wheeling; other forms of stranded investments may also occur as part of a utility's normal business risk under traditional regulation and these are not considered here since they are not a new risk. In general, stranded investment (attributable to the introduction of retail wheeling) could occur if customers leave a utility's system for another source of supply and if large numbers of customers pay market-based rates instead of higher regulated rates as a result of a

utility's response to competitive pressures.2

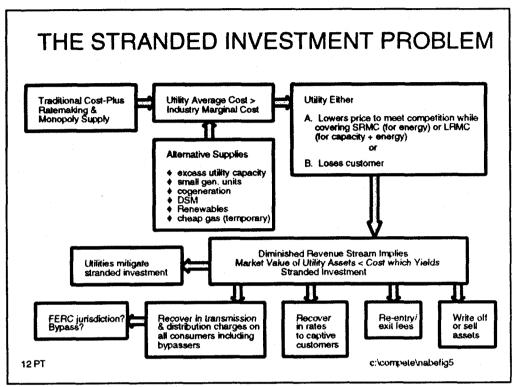


Figure 4

For the purposes of this investigation, stranded investment applies only to prudently incurred costs. Regulatory assets such as deferrals of costs allowed by regulators can be stranded as a result of allowing retail wheeling.

Utilities can mitigate or offset stranded investment relative to current levels of wholesale and retail marketing by developing new markets, attracting new customers, maintaining existing customers, selling in newly opened markets, reducing costs, changing the rate of amortization of existing assets, and selling assets (such as transmission facilities or customer data bases) whose market value is higher than book value.

Stranded investment could be negative, indicating that utility average prices are lower than long run marginal cost and that the market value of the associated assets is higher than book value. Such a situation could occur if, for example, natural gas prices increase greatly and if investments in generation are for gas-fired power plants. If electricity is priced at marginal cost, rates would be higher than they would be under traditional regulation, but the relatively high price would serve as a price signal to engage in additional demand side management and to search for less costly generation.

Table 3. Who Bears the Costs of Stranded Investment?

Options	Who Bears Cost of Stranded Investment?				
	Utility/ Investors	Utility Ratepayers	Bypassing Consumers	Remarks	
Utility writes off or writes down assets or sells assets at market value	✓ share values diminish; for coops U.S. govt loans may not be repaid as quickly; utilities may default on loans			property tax payments could decline; higher cost of capital due to greater riskiness of utility business	
Utility recovers stranded investment thru re-entry or exit fees			✓ raises effective electricity price of bypasser	lower risk for utilities	
Utility recovers stranded investment thru transmission or distribution charges		✓ bypassers and utility customers paying discounted rates pay for stranded investment (if transmission service is used)		seller may absorb some of charges to make sale; lower risk for utilities	
Utility recovers stranded investment thru higher rates to its customers		✓ remaining ratepayers pay for stranded investment, but higher rates may exacerbate attempts at bypass		more consumers bypass utility	
Utility offsets stranded investment thru sales of new services or sales to new customers	✓ may mitigate or offset adverse impact on investors			property tax payments could decline; possibly higher risk to utility & higher cost of capital affecting rates	
Mixture of options	distribution of impacts depends on the mixture of options selected				

Table 4. Societal Impacts of Stranded Investment

	Impacts			
Options	Economic Efficiency	Consumer Responsibility for Prudent Capacity	Comments	
Utility writes off or writes down assets or Utility sells assets at market value	price of electricity should tend toward marginal cost, thereby increasing efficiency of energy/power choices; introduction of retail wheeling creates new risk that may affect cost of capital	perception that bypassers are avoiding payments for previous investments to serve them	insolvent/bankrupt utility may not be able to serve some areas & no other suppliers may enter market	
Utility recovers stranded investment thru re-entry or exit fees	price of electricity > marginal cost leading to inefficient energy/power choices	as a group, beneficiaries of past investments pay for those investments;	temporary fees could be regarded as transition costs	
Utility recovers stranded investment thru transmission or distribution charges	price of electricity > marginal cost leading to inefficient energy/power choices	as a group, beneficiaries of past investments pay for those investments	temporary fees could be regarded as transition costs; may reallocate costs more heavily on low income consumers and on remaining utility customers; other users may also pay for stranded investment in wheeling charges	
Utility recovers stranded investment thru higher rates to its customers	price of electricity > marginal cost leading to inefficient energy/power choices	perception that bypassing consumers are avoiding payments for previous investments to serve them	reallocates costs to captive customers; may reallocate costs more heavily on low income consumers and on remaining utility customers; could exacerbate attempts at bypass	
Utility offsets stranded investment thru sales of new services or sales to new customers	price of electricity should tend toward marginal cost, thereby increasing efficiency of energy/power choices	perception that consumers are avoiding payments for previous investments to serve them	and with the second	
Mixture of options	effect of impacts depends on the	e mixture of options selected	i	

Collection of Stranded Investment

Stranded investment may be: borne by the utility writing off or writing down assets or selling assets at market value; recovered from bypassing consumers through exit fees or re-entry fees; recovered from consumers who obtain discounted rates and from bypassing consumers through transmission or distribution charges; recovered from remaining utility customers through higher rates; and offset through sales or new services to sales to new customers.

The proportion of stranded investment attributable to retail wheeling to be borne by utility shareholders versus utility customers or former customers is a matter of policy. The allocation of stranded investment costs among customers or former customers could reflect those customers' responsibility for the investment which has become stranded.

The time period over which stranded investment would be collected could be limited to a period of transition from a regulated environment to a competitive environment (e.g., 5 years). However, if the collection of stranded investment from utility customers or former customers is stretched out 20 or 30 years, the benefits from a competitive marketplace will be greatly delayed.

Stranded cost charges could vary from utility to utility and from state to state. Utilities with lower stranded cost charges levied on customers or former customers may have a competitive advantage relative to utilities with higher stranded cost charges.

Magnitude of Stranded Investment

The magnitude of stranded investment is unknown but potentially several hundred million dollars in Arizona. It will depend on such factors as fuel prices, when independent power producers enter the Arizona market, the nature and timing of retail wheeling, and the period over which investments are assumed to be stranded (e.g., 5 years, 30 years). Further, the magnitude of stranded investment is expected to change over time as conditions change. Thus, estimates can be made of the magnitude of stranded investment in Arizona, but those estimates will reflect the underlying assumptions used in the forecast.³ Errors in estimates of stranded investment can have a major impact on parties responsible for paying for that stranded investment and on the utility.

For regulatory purposes, the magnitude of stranded investment could be either forecast once, at the time retail wheeling is introduced, or revised on a regular basis taking into account market developments.

³ If regulators require that utilities divest themselves of generating assets simultaneously, the market value of generation assets could be depressed because of a temporary glut of supply resources being sold.

The concept of stranded investment (due to regulatory changes pertaining to retail wheeling) applies to the entire utility system and the magnitude of stranded investment cannot be inferred from the market value of only some assets. If utilities sell some assets at market value, the market value will reflect stranded investment due to expected or actual regulatory changes pertaining to retail wheeling and will reflect other causes of stranded investment, if any, as well as factors that would increase the asset value above book value.

"Stranded Obligations"

Those utilities which participate in the Palo Verde Nuclear Generating Station will have obligations to pay for the proper disposal of radioactive waste. These costs are being collected from customers in a decommissioning fund which may or may not be adequate to cover all the costs of waste disposal. If retail wheeling occurs, will the obligation to pay for radioactive waste disposal be stranded, in that the revenues into the decommissioning fund and subsequent increases in that fund are inadequate? To ensure an adequate revenue stream, a stranded cost recovery mechanism such as transmission or distribution charges or exit fees (paid in installments) could be imposed until the proper decommissioning of the plant is completed. Thus, consumers could pay for stranded obligations for a period much longer than they would pay for stranded investment.

Transaction Costs and Consumer Protection

Transaction costs are the costs of participating in the market, i.e. the costs of gathering and processing information on price and quality, and the costs of managing price and performance risks. With regard to retail electric competition (including retail wheeling, self generation, and other distributed energy resources), typical elements of transaction costs, for both buyers and sellers, could include:

- ♦ the costs of determining market prices
- ♦ the costs of learning about the unbundled elements of electricity supply
- the costs of developing contractual arrangements to manage uncertainties about future fuel, operating, maintenance, and capital costs of providing electric energy services
- the costs of developing contractual arrangements to manage the risks of price instability
- the costs of developing and enforcing performance expectations (such as reliability of supplies or impacts of consumer operational fluctuations)
- the costs of consumer protection from misunderstandings or fraudulent practices; in the competitive market for electricity, residential, commercial, and industrial consumers may be victims of fraudulent or misleading energy portfolio management schemes.

Many of these transaction costs are now managed by monopoly utilities and regulators. In a competitive market, these costs may increase and may be managed by various buyers and sellers. High transaction costs (relative to the benefit of electric energy services) may prevent residential and smaller commercial and industrial consumers from participating in a competitive market for electricity on an individual basis. Thus, there may be a benefit to endeavoring to reduce transaction costs. However, market forces may be able to reduce transaction costs without regulatory intervention.

Among the actions which the Commission might take to reduce transaction costs and enhance consumer protection are:

- ♦ Educating consumers about the elements of electric energy services and factors affecting transaction costs.
- ♦ Developing standardized contracts for small consumers which would leave prices open to negotiation but could have a standard menu of options and clear delineation of buyers' and sellers' responsibilities regarding quality of service and price and performance expectations. Standardized contracts may quickly evolve in the marketplace, anyway, to reduce transaction costs.
- ♦ Licensing and regulating suppliers to ensure consumer protection, especially for residential and smaller commercial and industrial consumers.
- Resolving disputes between buyers and sellers. Disputes could arise from possibly misleading sales offers, from situations in which the consumer's pattern of demand varies from the pattern assumed at the time the contract was written, and from situations which are not addressed in the contract. The role of the Commission may be limited because buyers and sellers could be located in different jurisdictions. Further, if there are numerous disputes, the Commission could be overwhelmed by the volume of activity.

The Role of Regulation

Rate regulation would still apply in noncompetitive markets under the scenarios where there is either: a) limited competition (e.g., direct access to generators being practically available only to some customers or aggregates of customers such as those with a demand greater than 500

⁴ For example, in competitive telecommunications markets, some providers engage in "slamming" in which the consumer's long distance provider is changed without the consumer's knowledge or consent.

⁵ Contracts could specify the jurisdiction where disputes would be resolved.

kW), or b) regulatory rejection of retail wheeling altogether. Regulation in noncompetitive markets may be used to improve the efficiency of producing and delivering electricity, thereby lowering costs to consumers.

Table 5 summarizes the discussion of what activities would be regulated under the three broad options of full competition (where all consumers have choices among generators), limited competition (where only some consumers have choices among generators), and no retail wheeling.

Regulators might act as the agent for consumers without practical choices among generators and could contract with the utility for the provision of those services to these consumers. The contract would address such factors as prices and price adjustments (if any), quality of services, quantity of services, timing of supplies, special features such as DSM or renewables, and a term of performance. Alternatively, regulators could regulate the firm, i.e. the utility, its operating characteristics (such as fuel mix), its costs and cost structure, its accounting profits, and its methods. This reflects features of traditional utility regulation.

Box B. Guidelines for Incentive Regulation

- 1. Use incentive regulation to better employ the firm's superior information.
- 2. Prioritize regulatory goals and design incentive regulation to achieve stated goals.
- 3. Link the firm's compensation to sensitive measures of its unobserved activities.
- 4. Avoid basing the firm's compensation on performance measures with excessive variability.
- 5. Limit the firm's financial responsibility for factors beyond its control.
- 6. Adopt broad-based performance measures where possible, unless their variability is excessive.
- 7. Choose exogenous performance benchmarks.
- 8. Allow the firm to choose among regulatory options, while recognizing the interdependencies among the regulatory options that are offered to the firm.
- 9. Promise only what can be delivered, and deliver whatever is promised.
- 10. Plan for the rare, unforeseen event, but minimize afterthe-fact adjustments to the announced regulatory policy.

Source: David Sappington, "Designing Incentive Regulation," Review of Industrial Organization, vol. 9 (1994): 245-272.

To promote more efficient utilities under regulation, incentive or performance based ratemaking may be used. Box B presents some guidelines for incentive regulation.

⁶ We use the terms incentive regulation and performance based ratemaking synonymously here.

Table 5. Activities Which May Be Regulated

Activities	Competitive Environment			
	(a) All Consumers Have Choices Among Generators	(b) Only Some Consumers Have Choices Among Generators	(c) No Retail Wheeling	
Central Station Generation	siting; but not rates competitive market	siting; see column (c) for monopoly portion of market; no rate regulation in competitive portion of market	siting; part of rate regulation unless utilities divest generation	
Transmission	line siting; federal rate regulat	ion		
Generation & Transmission System Operation	regulation of Independent Syste to ensure impartiality and to se ISO, regulation to ensure comp transmission	if no ISO, costs & procedures reviewed in ratemaking; if ISO & poolco to promote wholesale competition, see columns (a) & (b)		
Distribution	rates regulated; local siting ordinances apply			
Distributed Generation: on Consumer's site	not regulated competitive market; siting regulations apply	not regulated in competitive market; see column (c) for monopoly portion of market	not regulated, unless generation owned by utility (?)	
Distributed Generation: to Augment T&D	rates regulated part of monopoly system			
Retailing of kWh to End Users	not regulated competitive market	not regulated in competitive market; rates regulated for monopoly service	rates regulated monopoly	
Funding of Mandated DSM	required payments on retailing or distribution services to finance mandated DSM, if any			
Wholesale Power Marketing	federal licensing; no rate regulation			
Energy Portfolio Managers	possible guidelines & licensing, especially to serve smaller consumers; no rate regulation	in competitive market same as column (a); not applicable in noncompetitive market	not applicable	

Performance based ratemaking for the noncompetitive market could promote the economically efficient use of resources, bring the benefits of today's lower long run marginal costs to all consumers, and enable the utility to enhance its ability to compete if the transition to competition advances. Table 6 identifies major elements of performance based ratemaking, viewing that ratemaking as a contract between the regulators (on behalf of consumers without access to competitive suppliers) and the utility. The table also indicates the risks, incentives, and benefits which a particular component of the ratemaking "contract" might create.

Benchmarking prices is crucial. The benchmark could be outside the control of the parties and may be based on the long run marginal costs of generic capacity additions developed by the federal government or other independent body, fuel price futures or indexes, and electricity price futures (when developed) or indexes. In addition, allowances must be made for area-specific cost elements (such as the number of customers per mile of distribution line). For customers of regulated services to benefit from today's marginal costs being lower than average cost, the benchmark cannot rely solely on average cost.

Uncertainty over how benchmark costs will change over time must also be considered in the contract. The table indicates several mechanisms for managing risk, including selection of a term for the contract.

Obligation to Serve

With retail wheeling, providers of transmission and distribution services have an obligation to serve, as long as they are properly compensated. But, providers of generation (including back-up services) in a competitive market have the opportunity to serve and market price signals would work to match supply with demand; only in the absence of competition would providers of generation have an obligation to serve. Providers of generation services in a competitive market have an obligation to honor their contracts, of course.

Legal Issues

There are several legal issues inherent in pursuing retail wheeling. Among these are:

- The complexity and legality of compulsory divestiture of generation, transmission, and distribution facilities by vertically integrated utilities.
- ♦ The regulatory and legal basis for permitting retail wheeling given exclusive (i.e. monopoly) certificates of convenience and necessity.

Table 6. Elements of Performance Based Ratemaking for Noncompetitive Market

Component of Ratemaking Contract		Risks/Incentives/Benefits	
		To Utility	To Customers
Bench- marking prices	To marginal cost (MC) for generation (e.g., MC of generic unit or of specific utility)	ensures covering marginal cost, price could be < avg cost; long run MC appropriate to reflect costs of adding capacity	risk that utility MC > optimal
	To market price index for generation	price could be < utility MC, avg	
	To average cost		price could be > MC
Uncertainty of Future Costs	Fixed price over term of contract	marginal cost could increase rapidly, adversely affecting utility	price stability, but could forego benefits of falling MC
	Price escalators tied to other market information	could alleviate risk of rapidly increasing MC	could reflect decreasing MC
	Contract re-opener	prevents extreme risks	prevents extreme risks
	Diverse portfolio of supply/demand resources	to hedge against rapid increases in MC	to hedge against rapid increases in MC
Term of Contract (see uncertainty above)	Short	allows frequent realignment of rates & costs	allows frequent realignment of rates & costs
	Long	may lock in some desirable features but risk that costs and rates diverge greatly	may lock in some desirable features but risk that costs and rates diverge greatly
Maximum/ Minimum Power & Energy	Specified limits	makes longer term planning less risky	supplying unanticipated load growth or loads less than the minimum may be expensive
	Supply all requirements	makes longer term planning riskier	
Minimum Quality & Reliability Standards		note: industry is self regulated with respect to many technical aspects of quality & reliability	may protect consumers; consumers desiring higher quality can contract separately
Rewards & penalties	For customer satisfaction	encourages attentiveness to customer needs	setting standards may be complicated
	For energy efficiency	incentive must be compared with profits of load building	to encourage DSM that is less costly than kWh & kW
	For productivity	encourages economic efficiency	setting standards may be complicated; customers could share savings

- ♦ The need for federal legislation permitting or requiring reciprocity among utility service areas since neither state regulators nor state legislators have comprehensive jurisdiction over existing service areas.
- ♦ The ability to engage in performance based ratemaking under Arizona law requiring that rates be set considering fair value.
- ♦ Creation of a "level playing field" where no generators have artificial advantages or disadvantages emanating from tax treatment, government financing, or regulation.
- ♦ The potential for and consequences of degradation of electric service to rural or other areas.
- ♦ The Rural Utilities Service's and the federal government's responsibility to obtain repayment on the loans they made to rural electric cooperatives.
- ♦ Limitations on the ability of cooperatives to sell electricity to non-members.
- ♦ The relative importance of economic forces promoting competition and of legal barriers to competition.
- Equality of access to the benefits of competition for all types of consumers.

IV. ENERGY EFFICIENCY AND THE ENVIRONMENT

Under regulation, considerable attention has been given to energy efficiency and the environment in connection with electric utility long range planning. If retail wheeling is introduced, will the public interest in energy efficiency and environmental protection be adequately fostered? Four aspects of energy efficiency and the environment are discussed here: demand side management (DSM), renewable generating resources, environmental effects of power production and delivery, and integrated resource planning.

Demand Side Management

DSM is defined by the Energy Information Administration as "the planning and implementation of strategies designed to encourage consumers to improve energy efficiency, reduce energy costs, change the time of usage, or promote the use of a different energy source." DSM can be a long-term, cost effective, resource that substitutes for generation, transmission, or distribution resources; it may be less costly to society than power generation, transmission, or distribution facilities. Consumers who employ DSM will see lower energy bills and suppliers of DSM may offer DSM services as a profitable business. In some instances, DSM may be viewed as a social program that is not cost effective and as an environmental resource because it may reduce pollution associated with power production.

The continuing existence of significant opportunities for DSM suggests that the cost of participating in the market for DSM may preclude adoption of some cost effective DSM measures. Utility DSM programs are intended to lower these transaction costs and to help transform the market so that cost effective DSM measures are widely available and marketed actively. DSM is also promoted through building codes and appliance standards, and by Energy Service Companies (ESCOs). Utility DSM programs have been criticized because non-participants may balk at paying for others' DSM.

In a competitive environment, the question is whether cost effective DSM will still be provided. If it is not, competition will, ironically, result in inefficiency. Figure 5 indicates that utilities may approach DSM as a customer service or drop DSM as part of their business strategies. The DSM market may exhibit high transaction costs (e.g., limited consumer

⁷ Commercial Buildings Characteristics 1992, DOE/EIA-0246(92), April 1994, p. 427.

DSM could be provided on a totally unregulated basis, by a separate government agency responsible for implementing DSM, or through a quasi-governmental agency which collects funds for DSM for private sector implementation. DSM programs could be divided into:

Cost-effective DSM;

Socially desired DSM that may have a long payback or for which savings are hard to measure,
 such as educational programs or low income programs;

Customer retention or attraction DSM programs.

information about the costs or benefits of DSM, limited risk management tools), or low transaction costs. Transaction costs are decreasing for some commercial and industrial customers because trade allies are stocking more energy efficient equipment, and some large consumers undertake systematic reviews of DSM opportunities and follow through if DSM is competitive with other organizational objectives & projects.

There are four outcomes shown in the figure. The one of concern is the upper right hand box, where transaction costs are high, thereby limiting the role of ESCOs, and where utilities withdraw from wide application of DSM programs, resulting in energy inefficiency.

Some utilities may reject DSM in a competitive environment because their profits are perceived to be linked only to the volume of energy produced, transmitted, or delivered and reductions in the volume of energy imply a reduction in profits. Utilities may

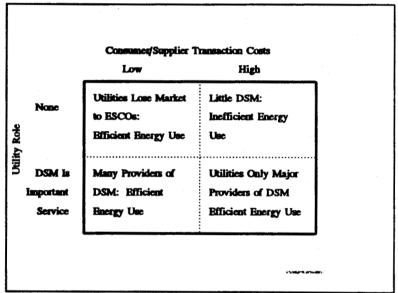


Figure 5 Possible Outcomes for DSM

also regard DSM as an avoidable cost and to remain competitive, they must avoid all possible costs in the short term. Utilities may now engage in DSM only to keep regulators happy and may discontinue DSM if regulatory requirements are relaxed. Utilities may further regard themselves to be at a disadvantage if their competitors (e.g., independent power producers) do not have to provide and pay for DSM services.

In contrast, some utilities could offer DSM in a competitive environment, whether or not ESCOs also provide DSM. Utility-provided DSM could be a profitable, customer-driven service to attract or retain customers and marketed as a service that consumers value. DSM could be offered as an unbundled service or as part of a package of services (which could include kilowatt hours of electricity). DSM could also be marketed to promote an energy efficient society (perhaps linked to energy standards and codes).

If utilities abandon DSM, other businesses may pick up the slack if transaction costs do not greatly restrict the market. Trade allies may use DSM as a business strategy, and ESCOs may package DSM with other services (e.g., plant maintenance services). However, ESCOs may concentrate only on larger commercial and industrial consumers, not smaller commercial

and residential consumers. Further, if electric rates fall, DSM will be less attractive to consumers. In a competitive environment, ESCOs may or may not wish to work with utilities, in contrast to past cooperation.

Renewables

Renewables can serve as generation resources or as resources to augment transmission and distribution system capacity. Further, renewables can be used at the consumer's site or at a central station. Renewables have several valuable features, including:

- use as a hedge against fossil fuel price uncertainty,
- modularity in which some renewables' capacity can be increased slowly or rapidly as needed,
- ♦ smaller environmental impacts in some instances than conventional generation technologies, and
- ♦ cost-effectiveness in some distributed applications, and possibly in some central station applications. Benefits of distributed renewables could include avoided distribution lines, deferred transmission capacity additions, deferred transmission maintenance, reduced energy losses, reduced environmental impacts, increased reliability, and modular design that better matches the size of the electric load. Benefits of central station renewables used for generation could include lower energy costs, reduced environmental impacts, hedges against uncertainty in fossil fuel prices and modular design that better matches the size of the electric load.

Retail wheeling may decelerate the development of renewables in favor of short run cost minimization. The transaction costs of renewables may prevent their use, even in what appear to be cost effective applications -- limited knowledge of how to use renewables in central station and distributed generation, transmission, and distribution situations, and limited perception of risk management techniques, for example. Electricity suppliers may thus overlook research and

⁹ Renewables are defined to be "... resources that continuously can be replenished in the course of natural events within the limits of human time" (Soil Conservation Society of America, Resource Conservation Glossary, 3rd edition, Ankeny, Iowa, 1982). Common forms of renewable energy technologies are:

biomass consisting of wood, wood waste, agricultural waste, municipal solid waste, and landfill and digester gas,

[•] geothermal resources, including hydrothermal resources and hot dry rock

[♦] hydropower

[♦] photovoltaics powered by sunlight

solar thermal resources (e.g. central receivers, dish Stirling generators)

[♦] windpower

development opportunities and neglect currently cost effective applications of renewables.

Renewables often have high up-front costs (and low operating costs), thereby making them less attractive to suppliers trying to avoid costs in the short term. If electricity suppliers seek to avoid costs in the short term, they will not make commitments to buy renewables today to help to lower costs in the long run. Manufacturing economies of scale may bring down future prices, but if demand grows slowly, these economies of scale may never be achieved.

Integrated Resource Planning

Integrated Resource Planning (IRP) for electric utilities has been adopted in over 30 states, including Arizona. Arizona utilities have completed two cycles of IRP and are preparing to commence the third IRP cycle.

Traditional IRP has several goals. It seeks to minimize the costs of providing electric energy services (including environmental costs); to ensure that utilities consider all viable resources (DSM, renewables, power purchases, conventional generation, etc.) on a comparable basis; and to foster a long term view of planning rather than a short term view. IRP also examines the reliability of the electric system. IRP can also contribute to improvement of analytical techniques such as decision making under uncertainty.

The IRP process is a public process. It allows stakeholders, regulators, and utility staff to seek solutions to complex problems in an open, public forum and allows increased accessibility of the public into the utility planning and decision-making process.

IRP has value to utilities. Utilities often engage in planning as a matter of good business practice, although private planning deviates from IRP. Utilities may use IRP to argue against future disallowances of the costs of those facilities that were reviewed in the IRP process, for example. Further, IRP allows parties to jointly plan up front and lessens the chances of utilities receiving blame after the fact. And IRP may improve utility decision making under uncertainty, with lower long run costs than would have otherwise occurred.

With emergence of interest in retail electric competition, the nature and appropriateness of IRP in a restructured, more competitive electric industry are uncertain (Hirst, Tonn, and Bauer, 1995; Hirst, 1994a and 1994b; Newcomb, 1994). The IRP process as it has been implemented, is cumbersome, and it may be incompatible with an increasingly frenzied market where flexibility over short time periods is necessary.

In a competitive environment, planning could start from a focus on consumer needs. This contrasts with traditional planning practice which starts from estimates of aggregate demand, moves to large, central station plant selection, and finally addresses the transmission and

distribution system that is needed to get the electricity from the large plants down to the individual customers. Planning in a restructured industry may start from the needs and demands of the individual consumer and then might proceed in the opposite direction. This will force the electricity provider to learn what customers want and what it costs to serve them.

As competition emerges, differences in requirements to conduct resource planning may adversely affect utilities. Some organizations are required to do IRP, and some, such as municipal utilities or independent power producers, are not. If only some are required to engage in IRP, are they at a disadvantage? If IRP was transformed into strategic planning, would organizations engaged in strategic planning be at a disadvantage? Utility competitors are likely to engage in long term planning, albeit as a private, not public activity. However, the demands of large customers could dominate planning and decisions in a privatized, competitive environment.

What would be foregone if IRP is abandoned in a competitive environment? Planning could lose its long term focus. Various useful planning techniques and strategies could be discontinued and replaced with a short-run, quarterly profit focus. A short term focus could be detrimental to consumers, since prices may be higher in the long run than they would have been with careful long term planning.

Further, without resource planning, it is unclear whether system reliability will be maintained and who will be responsible for maintaining system reliability.

Public involvement in planning will change if retail wheeling occurs. Depending upon the type of restructuring adopted (if any), public involvement may be more; it may be less; or it may change significantly in nature. Opportunities for public input could increase through utility/provider-sponsored focus groups, surveys, or public meetings. Further, the responsiveness of competitive markets will replace public involvement in integrated resource planning, rate hearings, etc. However, those without market power will lose the current public involvement advantages that exist within IRP proceedings, and the market could overlook environmental externalities, eschew long term investments, and exclude some resources (such as DSM) because of high transaction costs.

The IRP process also generates considerable public information. Some of this information will become "proprietary" in a competitive market and it will no longer be available to the public.

Environmental Issues

One of the major concerns related to the possibility of electric industry restructuring is that environmental impacts may increase as utilities and other electricity providers strive to be

low-cost providers of kilowatt-hours. Under traditional IRP, environmental impacts of power production and delivery can be examined.

If some generators (i.e. utilities) are required to consider environmental impacts beyond existing standards because of a utility regulatory requirement, but others escape this requirement, will the regulated utilities be at a competitive disadvantage? In a competitive situation, some generators may thus wish to abandon all consideration of environmental impacts, beyond what is required in state or federal regulations, in order to lower their market price.

Environmental strategies may be pursued without IRP, however. Voluntary corporate commitments that reflect both economic and non-economic motivations may cause utilities to go beyond mere compliance with existing environmental standards. Actions utilities could take are:

- 1. Systematic analyses of the costs of meeting current environmental standards and regulations and future environmental standards and regulations which can reasonably be anticipated.
- 2. Reduction of the costs identified above through such means as process improvements, reduction of pollution, substitution of demand side management for electric energy, offsetting environmental impacts with additional activities, and selection of fuel, including solar and other renewable energy sources.
- 3. Sale of electricity from renewable resources to market segments willing to pay for improved environmental quality associated with renewables ("green pricing").
- 4. Market transformation activities to lead the industry in reducing adverse environmental effects of energy production.
- 5. Identification and analysis of technologies which have less adverse impacts on the environment than current practice.
- 6. Alliances with other organizations or programs for promoting environmental quality (e.g., the Environmental Protection Agency's Green Lights Program).

Many industries incorporate environmental goals in their plans. See, for example, Sheryl Sturges and Jeffrey Hewitt, "Progress of a Policy Experiment: Climate Challenge Interim Report Card," *The Electricity Journal*, January/February 1995: 60-70; "The Challenge of Going Green," *Harvard Business Review*, July-August 1994: 37-50; Kurt Fischer and Johan Schot, eds., *Environmental Strategies for Industry*, Washington, D.C.: Island Press, 1993; Thomas Sullivan, ed., *The Greening of American Business, Rockville, Maryland*: Government Institutes, Inc. 1992; Paul Hawken, *The Ecology of Commerce*, New York: HarperCollins, 1993.

7. Corporate commitment to implement the strategic environmental plan.

These kinds of elements of an environmental strategic plan are consistent with IRP and with unregulated business planning in general.

REFERENCES ON RETAIL ELECTRIC COMPETITION

- Abdoo, Richard. "Wisconsin Electric's View of a More Competitive Industry." Public Utilities Fortnightly. February 15: 17-19.
- Allegheny Electric Cooperative, Inc. and Duncan, Weinberg, Miller, and Pembroke, P.C. 1994. "Retail Wheeling Threats to Rural Electric Cooperatives: Rural Utilities Service Rights to Preempt State Retail Wheeling Actions which Adversely Affect Borrowers," G&T Wholesale Power Contract Task Force.
- Arizona Utility Investors Association. 1995. Position Paper on Competition in the Electric Utility Industry.
- Arny, Michael. 1994. An Integrated Approach to Restructuring the Energy Service Industry.

 Madison, Wisconsin: Consortium for Integrated Resource Planning, Department of Engineering Professional Development, University of Wisconsin.
- Austin, Tom. 1994. "IRP or Competition or Both: Living in an Evolving World," presented at the Arizona Corporation Commission Workshop on Competition in Electric Services, September 7.
- Baumol, William, and J. Gregory Sidak. 1995. "Stranded Cost Recovery: Fair and Reasonable," Public Utilities Fortnightly, vol. 133 (May 15): 20, 22-23.
- Baxter, Lester, and Eric Hirst. 1995. Estimating Potential Stranded Commitments for U.S. Investor-Owned Electric Utilities. Oak Ridge National Laboratory, ORNL/CON-406.
- Bayless, Charles. 1994. "Less is More: Why Gas Turbines Will Transform Electric Utilities," Public Utilities Fortnightly (December 1): 21-25.
- Bayless, Charles. no date. "Competition Transition: Is Pricing Strategy on the Wrong Side of the Road?" Draft. Tucson Electric Power Co.
- Berry, David, and Barbara Keene. forthcoming. "Contracting for Power," Business Economics.
- Black, Bernard. 1994. "A Proposal for Implementing Retail Competition in the Electricity Industry," *The Electricity Journal*, vol. 7 (October): 58-72.
- Bloom, Melvin, and Choi Lee. 1994. "Competition in Electric Service," presented at the Arizona Corporation Commission Workshop on Competition in Electric Services, September 7.
- Blumstein, Carl, and James Bushnell. 1994. "A Guide to the Blue Book: Issues in

- California's Electric Industry Restructuring and Reform," *The Electricity Journal*, vol 7 (September): 18-29.
- Brockway, Nancy. 1994. A Low-Income Advocate's Introduction to Electric Industry Restructuring and Retail Wheeling, Boston: National Consumer Law Center.
- Buchanan, Shepard. 1994. "The Entrepreneurial Utility: Salvation or Last Gasp for IRP?" presented at the National Association of Regulatory Utility Commissioners Fifth National Conference on Integrated Resource Planning, Kalispell, Montana, May.
- Budhraja, Vikram, and Fiona Woolf. 1994. "POOLCO: An Independent Power Pool Company for an Efficient Power Market," *The Electricity Journal*, vol 7 (September): 42-47.
- Burke, Michael. 1995. "Earthquakes and Utility Rates: Creating a Competitive Electric Utility Market," Pasadena, California: New Energy Ventures, Inc.
- California Public Utilities Commission. 1994. Order Instituting Rulemaking and Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation, R.94-04-031 and I.94-04-032, April 20.
- California Public Utilities Commission. 1995. Order Instituting Rulemaking on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation. Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Service Industry and Reforming Regulation. R.94-04-031 and I.94-04-032, May 24.
- Cohen, Armond, and Steven Kihm. 1994. "The Political Economy of Retail Wheeling, or How to Not Re-Fight the Last War," *The Electricity Journal*, vol. 7 (April): 49-61.
- Connecticut Department of Public Utility Control. 1994. Draft Decision: DPUC Investigation into Retail Electric Transmission Service, Docket No. 93-09-29.
- Connors, Stephen. 1994. "Competition, Coordination, and Compliance: The Role of Integrated Resource Planning in a Competitive Industry," presented at the National Association of Regulatory Utility Commissioners Fifth National Conference on Integrated Resource Planning, Kalispell, Montana, May.
- Cook, David. 1995. "Metering Relationships in the Era of Deregulation," Public Utilities Fortnightly, March 1: 36-38.

- Costello, Kenneth, Robert Burns, Youssef Hegazy. 1995. "How State Regulators Should Handle Retail Wheeling," Public Utilities Fortnightly, February 15: 26-29.
- Cross, Philip. 1994. "Redial Wheeling -- Happy Motoring for State Regulators?" Fortnightly (June 15): 46-49.
- Dar, Vinod. 1994. "Electricity: The Future Cannot Be Predicted -- But It Can Be Invented," The Electricity Journal, vol. 7 (December): 58-63.
- Dar, Vinod. 1995. "The Future of the U.S. Electric Utility Industry," *The Electricity Journal*, vol. 8 (July): 16-25.
- Derthick, Martha and Paul Quirk. 1985. The Politics of Deregulation. Washington, D.C.: The Brookings Institution.
- **Douglas, John.** 1994. "Buying and Selling Power in the Age of Competition," *EPRI Journal*, vol. 19 (June): 6-13.
- **Douglas, John.** 1994. "The Challenges of Open Access," *EPRI Journal*, vol. 19 (September): 6-15.
- Edison Times. 1995. "Comments in FERC's Stranded Cost NOPR," (January): 8-13.
- Electric Generation Association. 1995. The State of Competition: A Survey of State Commissions on Competition in the Electricity Industry, Washington, D.C., Survey conducted by Boston Pacific Co.
- Electricity Consumers Resource Council. 1994. Retail Competition in the U.S. Electricity Industry, Washington, D.C.
- Federal Energy Regulatory Commission. 1994. Notice of Proposed Rulemaking, Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Docket No. RM94-7-000, 59 Federal Register 35274 et seq. (July 11).
- Federal Energy Regulatory Commission. 1995. Notice of Proposed Rulemaking and Supplemental Notice of Proposed Rulemaking, Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities, and Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, Docket Nos. RM95-8-000 and RM94-7-001. 70 FERC 61,357.
- Fitch Investors Service, Inc. 1994. Regulators on Retail Wheeling, October 31.

- Foster Electric Report. 1995. "Parties Maintain Positions in Reply Comments to FERC Stranded Investment NOPR," (February 1, Report No. 53): 4-13.
- Fox-Penner, Peter. 1994. "Electricity in a Competitive Environment: The Real Issue Is Not Retail Wheeling," Edison Times IRP Quarterly. Washington, D.C.: Edison Electric Institute (Fall): 1-10.
- Fusaro, Peter. 1995. "History of Energy Derivatives," presented at the Power Marketing Association Meetings, Scottsdale, Arizona, March 16-17.
- Garber, Don, William Hogan, and Larry Ruff. 1994. "An Efficient Electricity Market: Using a Pool to Support Real Competition," *The Electricity Journal*, vol 7 (September): 48-60.
- Garner, W. Lynn. 1995. "California Rides the Tiger," Public Utilities Fortnightly, vol. 133 (January 1): 20-23.
- Glynn, Robert. 1994. "Offering Customers Direct Access: Using Choice to Stimulate Competition," *The Electricity Journal*, vol. 7 (December): 52-57.
- Goldstone, Seymour. 1995. "California Utility DSM at the Crossroads," California Energy Commission DSM Issue Paper.
- Gottlieb, Jonathan, and Timothy Murphy. 1994. "The Emergence of Competition," Independent Energy, vol. 24 (October): 18-24.
- Harrington, Cheryl, Tom Austin, David Moskovitz, and Ed Holt. 1994. "IRP and Competition," presented at the National Association of Regulatory Utility Commissioners Fifth National Conference on Integrated Resource Planning, Kalispell, Montana, May.
- Hempling, Scott. 1994. "Depolarizing the Debate: Can Retail Wheeling Co-Exist with Integrated Resource Planning?" The Electricity Journal, vol. 7 (April): 24-33.
- Hempling, Scott, Kenneth Rose, and Robert Burns. 1994. The Regulatory Treatment of Embedded Costs Exceeding Market Prices: Transition to a Competitive Electric Generation Market. A Briefing Document for State Commissions. Committee on Electricity of the National Association of Regulatory Utility Commissioners.
- Henney, Alex. 1994. "Challenging the Status Quo: Privatizing Electricity in England and Wales," Fortnightly, vol. 132 (July 15) 26-31.

- Hirst, Eric. 1994a. Electric-Utility DSM Programs in a Competitive Market, Oak Ridge National Laboratory ORNL/CON-384.
- Hirst, Eric. 1994b. "Retail Competition May Put DSM Out of Business," Fortnightly, vol. 132 (September 15): 14-16.
- Hirst, Eric, and Lester Baxter. 1995. "How Stranded Will Electric Utilities Be?" Public Utilities Fortnightly, February 15: 30-32.
- Hirst, Eric, Bruce Tonn, and Douglas Bauer. 1995. "The Future of IRP and Other Public Goods in a Market-Driven World," *The Electricity Journal*, vol. 8 (April): 74-84.
- Hogan, William. 1994. "Efficient Direct Access: Comments on the California Blue Book Proposals." *The Electricity Journal*, vol 7 (September): 30-41.
- Hogan, William. 1994. "An Efficient Bilateral Market Needs a Pool," presented at California Public Utility Commission Hearings, San Francisco, August 4.
- Howe, John. 1994. "Making Evolution Work for Us: Structural Adaptation in the Electric Industry," *The Electricity Journal*, vol 7 (September): 68-73.
- Hyman, Leonard. 1993. "The Chaos of Competition: It's Only Just Begun," *The Electricity Journal*, vol. 6 (August/September): 37-39.
- Hyman, Leonard. 1995. "A Timid Proposal: Follow the Internet, Not Poolco," *The Electricity Journal*, vol. 8 (January/February): 21-27.
- James, Barbara. 1995. "A Modest Proposal for Shaping a Reasonable New World." The Electricity Journal, vol. 8 (March): 67-71.
- Jurewitz, John. 1994. "Retail Wheeling: Why the Proponents Must Bear the Burden of Proof," *The Electricity Journal*, vol. 7 (April): 62-70.
- Kahn, Alfred. 1994. "Can Regulation and Competition Coexist? Solutions to the Stranded Cost Problem and Other Conundra," *The Electricity Journal*, vol. 7 (October): 23-35.
- Kennedy, Jay, and Richard Baudino. 1991. "Retail Wheeling: Expanding Competition in the Electric Utility Industry," Kennedy and Associates, Atlanta, Georgia.
- Kimball, Donald. 1994. "Impacts and Consequences of the Loss of a Large Electrical Load on Rural Electric Cooperatives," Arizona Electric Power Cooperative.

- Kirby, Brendan, Eric Hirst, James Vancoevering. 1995. Identification and Definition of Unbundled Electric Generation and Transmission Services. Oak Ridge National Laboratory, ORNL/CON-415.
- Lesser, Jonathan and Malcolm Ainspan. 1994. "Retail Wheeling: Deja Vu All Over Again?" The Electricity Journal, vol. 7 (April): 34-48.
- Lewis, Steven, and Janet Besser. 1995. "The Competitive Generation Market Has Been Assumed, Not Proven," *The Electricity Journal*, vol. 8 (April): 70-73.
- Massey, William. 1995. "Transmission and Electric Rate Derivatives," presented at the Power Marketing Association Meetings, Scottsdale, Arizona, March 16.
- May, Michael. 1994. "The Twilight Zone of Retail Wheeling," *The Electricity Journal*, vol. 7 (December): 81-80.
- McCullough, Robert, and Ruben Brown. 1994. "Electric Industry Restructuring: The Effect on Rates Nationwide," Fortnightly, vol. 132 (July 15) 20-25.
- Messenger, Michael, and Rosella Shapiro. 1995. "The Potential Effect of Electric Industry Restructure and Regulatory Choices on Utility DSM Programs," California Energy Commission DSM Issue Paper.
- Michaels, Robert. 1994. "Wholesale Pooling: The Monopolist's New Clothes," *The Electricity Journal*, vol. 7 (December): 64-76.
- Michaels, Robert. 1995. "Stranded Investment Surcharges: Inequitable and Inefficient," Public Utilities Fortnightly, vol. 133 (May 15): 21, 24-25.
- Michel, Steve. 1993. "A Customer's View of Retail Wheeling," in Presentations and Papers from the National Seminars on Public Utility Commission Implementation of the Energy Policy Act of 1992, Columbus, Ohio: National Regulatory Research Institute.
- Minnesota Public Utilities Commission. 1995. In the Matter of an Investigation into Structural and Regulatory Issues in the Electric Utility Industry, Proposed Scope of Investigation, Docket E-999/CI-95-135.
- Morgan Stanley & Company. 1993. "Of Elephants and Blind Men: Assessing the Risks of Competition," U.S. Investment Research, Electric Utilities (October 25).
- Moskovitz, David, and Douglas Foy. 1994. "Looking for Peace in the Middle of a Nervous

- Breakdown," The Electricity Journal, vol. 7 (November): 22-33.
- Moyer, R. Charles. 1993. "The Impending Restructuring of the Electric Utility Industry: Causes and Consequences," *Business Economics*, vol. 28 (October): 40-44.
- Newcomb, James. 1994. The Future of Energy Efficiency Services in a Competitive Environment. Boulder, Colorado: E-Source. Strategic Issues Paper.
- National Rural Electric Cooperative Association. 1994. Letter from Glenn English, Executive Vice President, to Thomas Eddy, Rural Utilities Service, Re: Stranded Investment, Transmission Pricing, Retail Wheeling and Other Issues Relating to the Restructuring of the Electric Utility Industry, November 28.
- Northern States Power Company. 1994. Comments: Investigation on the Commission's Own Motion Into the Probable Costs and Benefits of Changing Electric Utility Company Structure and Regulation. Public Service Commission of Wisconsin, Docket 05-EI-114, October 31.
- O'Donnell, Earle and Laurel Glassman. 1989. "Industrial Opportunities to Engage in Direct Purchase of Electricity: The Purchaser's Perspective," *Journal of Energy and Natural Resources Law*, vol. 7, no. 2 101-124.
- Olson, Wayne, and Kenneth Costello. 1995. "Electricity Matters: A New Incentives Approach for a Changing Electric Industry," The Electricity Journal, vol. 8 (January/February): 28-40.
- Pechman, Carl. 1995. "Retail Competition in New York's Electric Power Industry," presented at Infocast's Competitive Power Sourcing for Industrial Companies, Chicago, March 16-17.
- Pembroke, James. 1994. "After Cajun, What Next for Stranded Costs?" The Electricity Journal, vol. 7 (October): 42-48.
- Penn, David. 1994. Change: The Old and New World of Competition. Washington, D.C.: American Public Power Association.
- Penn, David. 1995. "How Likely Is Long-Run Competition in Electricity Generation? Warning Signs," *The Electricity Journal*, vol. 8 (January/February): 12-20.
- Pierebon, James. 1994. "Welcome, Public Power, to Deregulation," Fortnightly, vol. 132 (September 15): 19-21.

- Public Utilities Fortnightly. 1994. Electric Executives' Forum: Who Should Pay for 'Stranded Investment' and Why?" (June 1): 34-48.
- Public Utilities Fortnightly. 1994. "Competition in Progress: An Interview with Stephen Littlechild," vol. 132 (November 15): 26-30.
- Public Utilities Fortnightly. 1994. "1994 State Regulators' Forum," vol. 132 (November 15): 36-55.
- Public Utilities Fortnightly. 1995. "PoolCo vs. Bilateral Markets?" vol. 133 (January 1): 24-36.
- Ridley, Scott. 1995. "Seeing the Forest from the Trees: Emergence of the Competitive Franchise," *The Electricity Journal*, vol. 8 (May): 39-49.
- Rouse, James. 1994. "Beyond Retail Wheeling: Competitive Sourcing of Retail Electric Power," *The Electricity Journal*, vol. 7 (April): 12-23.
- Rudman, Monica, John Sugar, Wendell Bakken, and Michael Messenger. 1995. "Effects of Electricity Industry Restructuring on Non-Utility DSM Activities," California Energy Commission DSM Issue Paper.
- Rural Utilities Service. 1994. Comments: Federal Energy Regulatory Commission's Pricing Policy for Transmission Services Provided by Public Utilities and Transmitting Utilities Under the Federal Power Act, Federal Energy Regulatory Commission, Docket No. RM 93-19-000, November 28.
- Salt River Project. 1995. "Competition and the Electric Utility Industry," Issue Brief.
- Sangha, Balvinder. 1995. "Financial Derivatives: Applications and Policy Issues." Business Economics, vol. 30 (January): 46-52.
- Sant, Roger. 1993. "Competitive Generation Is Here," The Electricity Journal, vol. 6 (August/September): 22-26.
- Sant, Roger, and Roger Naill. 1994. "Let's Make Electricity Generation Competitive," The Electricity Journal, vol. 7 (October): 49-57.
- Sappington, David. 1994. "Designing Incentive Regulation," Review of Industrial Organization, vol 9: 245-272.

- Sappington, David and Dennis Weisman. 1994. "Designing Superior Incentive Regulation: Accounting for All of the Incentives All of the Time," Fortnightly, February 15.
- Sappington, David and Dennis Weisman. 1994. "Designing Superior Incentive Regulation: Modifying Plans to Preclude Recontracting and Promote Performance," Fortnightly, March 1.
- Shuttleworth, Graham. 1994. "Electricity Transmission Pricing: Contracts Must Reflect Costs," *The Electricity Journal*, vol. 7 (December): 28-37.
- Speckman, Bernard, and Steven Schleimer. 1995. "A New Index Prices the Market," Public Utilities Fortnightly, March 1: 30-31.
- Spiewak, Scott. 1995. "The Commoditization of Electricity." presented at the Power Marketing Association Meetings, Scottsdale, Arizona, March 16-17.
- Stalon, Charles, and Eric Woychik. 1995. "Status and Direction of California's Electric Industry Restructuring: Summary Report of the Debate in the Competitive Power Market Working Group."
- Stalon, Charles, and Eric Woychik. 1995. "What Model for Restructuring? The Debate in the Competitive Power Market Working Group," *The Electricity Journal*, vol. 8 (July): 63-73.
- Stelzer, Irwin. 1994. "Restructuring the Electric Utility Industry: Further Tentative Thoughts," *The Electricity Journal*, vol. 7 (October): 36-41.
- Studness, Charles. 1995. "Retail Wheeling and Discriminatory Electric Rates," Public Utilities Fortnightly, vol. 133 (January 1): 44-45
- Strand, John. 1994. "Retail Wheeling: A View from Michigan," Formightly, vol. 132 (September 15): 29-33.
- Tonn, Bruce, and Anthony Schaffhauser. 1994. Perspectives on the Future of the Electric Utility Industry, Oak Ridge National Laboratory, ORNL/CON-385.
- Underhill, John. 1994. "Ancillary and Transaction Costs of Competitive Market Participation," presented at the Arizona Corporation Commission Workshop on Competition in Electric Services, September 7.
- Vallen, Marc, and Leslie Sharp. 1995. "Electricity Hubs and Market Centers: A New

- Business Tool for Electric Utilities?" The Electricity Journal, vol. 8 (July): 26-35.
- Welsh-Johnson, Donna. 1994. "Will the Fittest Survive?" Fortnightly vol. 132 (April 15): 18-22.
- Wisconsin Electric Power Company. 1995. Wisconsin Electric's View of a More Competitive Electric Industry (3rd revision).
- Woolf, Tim. 1994. "Retail Competition in the Electricity Industry: Lessons from the United Kingdom," *The Electricity Journal*, vol. 7 (June): 56-63.
- Yeager, Kurt. 1995. "Technology and Industry Structure," *The Electricity Journal*, vol. 8 (July): 50-62.
- York, Dan. 1994. "Competitive Electricity Markets in Practice: Experience from Norway," *The Electricity Journal*, vol. 7 (June): 48-55.